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EXAMINER	
KAO, CHIH CHENG G	

ART UNIT	PAPER NUMBER
2882	

DATE MAILED: 05/19/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/065,683	KEVILLE ET AL.	
	Examiner	Art Unit	
	Chih-Cheng Glen Kao	2882	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 September 2004*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-200* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *161-168,177,178 and 191-200* is/are allowed.

6)☒ Claim(s) *See Continuation Sheet* is/are rejected.

7)☒ Claim(s) *24,25,28-31,36-43,46-49,54,84,85,88-91,96-103,106-109,114,139,140,157 and 158* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *01 March 2005* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

Continuation of Disposition of Claims: Claims rejected are 1-23,26,27,32-35,44,45,50-53,55-83,86,87,92-95,104,105,110-113,115-138,141-156,159,160,169-176 and 179-190.

DETAILED ACTION

Information Disclosure Statement

1. The listing of references in the specification is not a proper information disclosure statement. 37 CFR 1.98(b) requires a list of all patents, publications, or other information submitted for consideration by the Office, and MPEP § 609 A(1) states, "the list may not be incorporated into the specification but must be submitted in a separate paper." Therefore, unless the references have been cited by the examiner on form PTO-892, they have not been considered. Note, for example, page 17, paragraph 75.

Specification

2. The disclosure is objected to because of the following informality. Replacement paragraph 91 for the Specification, in the Amendment filed 3/1/05, was cut off in the middle. Appropriate correction is required.

Claim Objections

3. Claims 19, 49, 53, 99, 113, 126, 128, 162, 164, 166, 168, 170, 172, 174, 176, 177, 179, 182, 187, 194, and 200 are objected to because of the following informalities, which appear to be minor draft errors including grammatical and lack of antecedent basis problems.

In the following format (location of objection; suggestion for correction), the following suggestions may obviate their respective objections: (claim 14, line 3, "said inlet flow means"; replacing "inlet" with - -outlet- -), (claim 19, line 2, "an upper electrode"; replacing "an upper"

with - -a lower- -), (claim 49, lines 2-3, "the extraction percentage group"; replacing "the" with - -an- -), (claim 49, line 4, "2% and 1%"; inserting a comma after "2%"), (claim 53, line 11, "said monitoring said"; inserting - -of- - after "monitoring"), (claim 74, lines 3-4, "said inlet flow means"; replacing "inlet" with - -outlet- -), (claim 99, line 33, "said at least one"; deleting "said"), (claim 113, line 11, "said monitoring said"; inserting - -of- - after "monitoring"), (claim 126, line 6, "said at least one element"; deleting "said"), (claim 128, line 6, "said at least one element"; deleting "said"), (claim 128, line 6; replacing the colon with a comma), (claim 162, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 164, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 166, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 168, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 170, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 172, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 174, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 176, line 2, "said $l = 1 / (\mu * \rho)$;"; inserting - -and wherein- - after the semi-colon), (claim 177, line 17, "said voltage differential"; replacing "said" with - -a- -), (claim 179, line 17, "said voltage differential"; replacing "said" with - -a- -), (claim 182, line 4, "approximately 100 m^2/g;"; inserting - -and- - after the semi-colon), (claim 187, line 5, "approximately 100 m^2/g;"; inserting - -and- - after the semi-colon), (claim 194, lines 2-3, "the extraction percentage group"; replacing "the" with - -an- -), (claim 194, line 4, "2% and 1%"; inserting a comma after "2%"), and (claim 200, line 24, "said detecting"; replacing "detecting" with - -identifying- -).

For purposes of examination, the claims have been treated as such. Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-121 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

In the original application, Applicants disclosed a cell for identifying and measuring concentrations. However, there is no mention of an "equivalent cell" for identifying and measuring. This subject matter was not described in the original specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. As such, the claims have been rejected for adding new matter.

5. Claims 1-61 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements, such omission amounting to a gap between the necessary structural connections. See MPEP § 2172.01. The omitted structural cooperative relationships are: means for obtaining data associated with said cell or an equivalent cell to deduce an identity, or measurement of concentration, of at least one element in said fluid.

The recitations in claim 1, for example, essentially recite a system for identifying and measuring concentrations comprising an ionic preconcentration cell and data. However, it is unclear how such data structure is defined by any structural and functional interrelationships between the data structure and the other claimed aspects of the invention, which permit the data structure's functionality to be realized. Means for obtaining data are essential in order to identify and measure concentrations.

6. Claims 38 and 98 are rejected under 35 U.S.C. 112, second paragraph, as being incomplete for omitting essential structural cooperative relationships of elements or essential steps, such omission amounting to a gap between the necessary structural connections or steps. See MPEP § 2172.01. The omitted structural cooperative relationships or steps are: a first calibration solution in relationship to a second calibration solution.

Claim 38 recites "a second calibration solution" in line 19. However, the claim, intervening claim, and base claim do not recite a first calibration solution prior to the second calibration solution. It is indefinite as to how one can have a second calibration solution without a first calibration solution. For purposes of examination, the claim has been treated as depending from claim 37 instead of claim 2, since a first calibration solution has been recited in claim 37.

Claim 98 has analogous recitations and issues. For purposes of examination, the claim has been treated as depending on claim 97 instead of claim 62.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. Claims 169-176, 179, and 180 are rejected under 35 U.S.C. 102(b) as being anticipated by Tran et al. (US Patent 6309532).

8. Regarding claims 169-176, Tran et al. discloses an ionic preconcentration cell (fig. 24), comprising an upper high surface area electrode (fig. 24, #524, and col. 30, lines 62-65), a lower high surface area electrode substantially parallel to the upper electrode (fig. 24, #526, and col. 31, lines 7-9), a central flow interelectrode gap separating said upper and lower high surface area electrodes by a gap width (fig. 24, #530), wherein the electrodes would necessarily have thicknesses less than or equal to $l = 1 / (\mu \rho)$, since it is within the range (col. 13, line 50).

9. Regarding claims 179 and 180, Tran et al. further discloses a gap width with a minimum gap width selected from a group consisting of 2 mm, 1mm, .5 mm, and .25 mm, and a maximum gap width selected from a group consisting of 2 mm, 5 mm, and 10 mm, which would necessarily be within the range of

$$d = \frac{\sigma \Phi}{q \varepsilon} \frac{w_i}{w_f} \frac{A}{n_f C F} \times 100\% \approx 2 \times 10^{-9} \frac{\Phi w_i A}{q \varepsilon w_f n_f F} \times 100\% \propto \frac{\Phi A}{\varepsilon F} ,$$

since the gap width is within that range (col. 29, line 7).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claims 1, 2, 4-8, 10-16, 18-23, 33-35, 50-53, 55-58, 62, 64-68, 70-76, 78-83, 93-95, 110-113, 115-118, 124, 125, 130, 134, 135, 137, 138, 143, 147, 149, 152, 153, 155, and 156 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. (US Patent 6309532) in view of Smallbone et al. (US Patent 4134012).

11. Regarding claims 1, 2, and 62, Tran et al. discloses system and method (col. 32, lines 45-48 and 54-56) comprising an ionic preconcentration cell (fig. 24), comprising an upper high surface area electrode (fig. 24, #524, and col. 30, lines 62-65), a lower high surface area electrode substantially parallel to the upper electrode (fig. 24, #526, and col. 31, lines 7-9), a central flow interelectrode gap (fig. 24, #530), fluid flow means for flowing a fluid (fig. 24, inflow and outflow), and voltage application means for applying a voltage differential between the electrodes while the fluid is flowing through the gap (fig. 24, (+) and (-)).

However, Tran et al. does not disclose calibration data associated with a cell exposed to x-rays used in combination with test data to deduce an identity, or measurement of concentration, of at least one element.

Smallbone et al. teaches calibration data associated with a cell exposed to x-rays (col. 12, lines 22-30) used in combination with test data to deduce an identity, or measurement of concentration, of at least one element (col. 12, lines 31-35).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. with the calibration of Smallbone et al., since one would be motivated to make such a modification to better obtain useful data for determining compositions of future samples (col. 12, lines 31-35) as implied from Smallbone et al.

12. Regarding claims 4, 5, 64, 65, 124, 125, 130, 143, 147, and 149, Tran et al. further discloses upper and lower x-ray (col. 16, lines 13-15) transmission windows in intimate contact with the electrodes (fig. 29, #603 and 605) and voltage application means for applying a voltage differential between the electrodes while the fluid is flowing through the gap (fig. 24, (+) and (-)).

13. Regarding claims 6, 7, 11, 12, 66, 67, 71, and 72, Tran et al. further discloses inlet and outlet flow means comprising a slot substantially coplanar with the gap (fig. 24, inflow and outflow).

14. Regarding claims 8, 13, 68, and 73, Tran et al. further discloses a plurality of flow tubes substantially coplanar with the gap and substantially parallel with one another (fig. 10, "inflow" and "outflow").

15. Regarding claims 10, 14, 70, and 74, Tran et al. further discloses access means for cleaning debris from inlet flow means (col. 18, lines 21-30).

16. Regarding claims 15, 75, 134, and 152, Tran et al. further discloses a body maintaining a position comprising a material comprising substantially no conductivity, resistance to ionic leaching, and resistance to radiation degradation (fig. 17, #352).

17. Regarding claims 16, 76, 135, and 153, Tran et al. further discloses a body maintaining a position comprising a material selected from a material group consisting of: plastic, glass, and fiberglass (col. 22, lines 23-24).

18. Regarding claims 18, 19, 34, 35, 78, 79, 94, and 95, Tran et al. further discloses an electrode thickness which would necessarily be less than or equal to $l = 1 / (\mu \rho)$ (col. 13, line 50), since it is within the range.

19. Regarding claims 20, 21, 80, 81, 137, 138, 155, and 156, Tran et al. would necessarily have electrodes having an ordinary surface area approximately equal to an interrogation spot area to which the cell is exposed (col. 33, lines 3-4).

20. Regarding claims 22, 23, 82, and 83, Tran et al. further discloses a gap width with a minimum gap width selected from a group consisting of 2 mm, 1mm, .5 mm, and .25 mm, and a maximum gap width selected from a group consisting of 2 mm, 5 mm, and 10 mm, which would necessarily be within the range of

$$d = \frac{\sigma \Phi}{q \varepsilon} \frac{w_i}{w_f} \frac{A}{n_f C F} \times 100\% \approx 2 \times 10^{-9} \frac{\Phi w_i A}{q \varepsilon w_f n_f F} \times 100\% \propto \frac{\Phi A}{\varepsilon F} \quad ,$$

since the gap width is within that range (col. 29, line 7).

21. Regarding claims 33 and 93, Tran et al. further discloses nano-cellular carbon aerogel (col. 9, lines 60-67).

22. Regarding claims 50 and 110, Tran et al. further discloses a voltage differential below an electrochemical potential of at least one element of interest and below an electrolysis potential of the fluid (col. 19, lines 43-49).

23. Regarding claims 51, 52, 111, and 112, Tran et al. further discloses leakage current monitoring means or ultra-low trace measuring means (fig. 5, #145) for monitoring a total concentration of dissolved ions in said upper and lower high surface area electrodes while said electrodes are not saturated, which is occurring prior to breakthrough (col. 15, lines 63-67).

24. Regarding claims 53 and 113, Tran et al. further discloses leakage current monitoring (fig. 5, #145), for monitoring a total concentration of dissolved ions in said upper and lower high

surface area electrodes while said electrodes are not saturated, which is occurring prior to breakthrough (col. 15, lines 63-67), and flow rate adjustment means for adjusting flow to control a percentage of ions extracted from said fluid, based on said monitoring of said leakage current by said leakage current monitoring means (fig. 5, #128, and col. 14, lines 51-53).

25. Regarding claims 55-57 and 115-117, Tran et al. further discloses triggering means (col. 14, lines 35-44) for injecting at least one element in the fluid or diluting (col. 7, lines 8-15) when the fluid has passed a predetermined threshold concentration, thereby maintaining said concentration within a predetermined concentration range (col. 12, lines 5-9).

26. Regarding claims 58 and 118, Tran et al. further discloses ionic release means for cleaning by releasing ions accumulated within said surface area into said fluid (col. 15, lines 4-8).

27. Claims 3, 45, 63, 105, 122, 123, 126-128, and 144-146 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Smallbone et al. as respectively applied to claims 2, 62, 125, and 143 above, and further in view of Fajt et al. (US Patent 6045685).

28. Regarding claims 3, 45, 63, 105, 126, 128, 144, and 146, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose a transportable voltage supply for connection during transport.

Fajt et al. teaches a transportable voltage supply for connection during transport (col. 13, lines 29-36).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the transportable voltage supply of Fajt et al., since one would be motivated to make such a modification for lowering costs and high portability of the system (col. 13, lines 29-37) as implied from Fajt et al.

29. Regarding claims 122, 123, 127, and 145, Tran et al. as modified above suggests a system as recited above.

However, Tran et al. does not disclose a transportable voltage supply embedded into a body.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with a transportable voltage supply embedded, since rearranging parts of an invention involves only routine skill in the art. One would be motivated to embed a transportable voltage supply to make the device more compact or easier to carry.

30. Claims 9 and 69 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Smallbone et al. as respectively applied to claims 6 and 66 above, and further in view of Taylor et al. (US Patent 4467206).

Tran et al. as modified above suggests a system and method as recited above. Tran et al. further discloses extraction of at least one element from the flow (abstract).

However, Tran et al. does not disclose turbulence enhancement means for enhancing a turbulence of flow of fluid to induce mixing of flow to enable uniform flow.

Taylor et al. teaches turbulence enhancement means for enhancing a turbulence of flow of fluid to induce mixing of flow to enable uniform flow (col. 10, lines 43-48).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the turbulence enhancement means of Taylor et al., since one would be motivated to make such a modification for more uniform distribution (col. 10, lines 43-48) as shown by Taylor et al.

31. Claims 17, 77, 136, and 154 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Smallbone et al. as respectively applied to claims 4, 64, 124, and 143 above, and further in view of Malcolm et al. (US Patent 4979198).

Tran et al. as modified above suggests a system and method as recited above. Tran et al. further discloses maintaining a cell body position (fig. 19).

However, Tran et al. does not disclose a non-conducting, machinable polymer substantially resistant to radiation degradation.

Malcolm et al. teaches a non-conducting, machinable polymer substantially resistant to radiation degradation (col. 5, lines 38-40).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with

the polymer of Malcolm et al., since one would be motivated to make such a modification to better allow x-rays through (col. 5, lines 38-40) as implied from Malcolm et al.

Also note that it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the polymer, since it is within the general skill of a worker in the art to select a known material motivated by its suitability, wherein the suitability for this case is better allowing x-rays through (col. 5, lines 38-40) as shown by Malcolm.

32. Claims 44, 59, 60, 104, 119, 120, 129, 131-133, 150, and 151 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Smallbone et al. as respectively applied to claims 4, 62, 64, 124, 125, and 149 above, and further in view of Ma (US Patent 6012325).

Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose an x-ray source means positioned and aligned relative to an x-ray transmission window for exposing a cell to x-rays substantially transmitted through the window, and x-ray fluorescence analysis means for analyzing and deducing a concentration.

Ma teaches an x-ray source means (fig. 1, #20) positioned and aligned relative to an x-ray transmission window (fig. 2, #32) for exposing a cell to x-rays substantially transmitted through the window (abstract), and x-ray fluorescence analysis means for analyzing (col. 5, line 10) and deducing a concentration (abstract).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with

the x-ray source and analysis means of Ma, since one would be motivated to make such a modification to sample the liquid without needing cryogenic fluids (col. 1, lines 49-53) as shown by Ma.

33. Claims 61 and 121 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Smallbone et al. as applied to claims 1 and 62 above, and further in view of Nelson et al. (US Patent 6349128).

Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose a telecommunications link for downloading and analyzing data.

Nelson et al. teaches a telecommunications link for downloading and analyzing data (col. 6, line 54, to col. 7, line 14).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the telecommunications link of Nelson et al., since one would be motivated to make such a modification to have more locations to analyze data from (col. 6, lines 54-67) as implied from Nelson et al.

34. Claim 148 is rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al. and Smallbone et al. as applied to claim 143 above, and further in view of Lubecki et al. (US Patent 4388530).

Tran et al. as modified above suggests a method as recited above.

However, Tran et al. does not disclose passing x-rays through a lower window.

Lubecki et al. teaches passing x-rays through a lower window (fig. 3).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the method of Tran et al. as modified above with the passing x-rays of Lubecki et al., since one would be motivated to make such a modification to be able to continuously measure (col. 3, lines 5-25) as implied from Lubecki et al.

35. Claims 26, 27, 32, 86, 87, 92, 141, 142, 159, 160, 181, 185, 186, and 190 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al., Smallbone et al., and Lubecki et al. as respectively applied to claims 1, 4, 5, 62, 64, 65, 124, 130, 143, and 148 above, and further in view of Nelson (US Patent 5982847).

36. Regarding claims 26, 27, 86, 87, 141, 142, 159, and 160, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose a polyimid film comprising structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns.

Nelson teaches a polyimid film comprising structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns (col. 10, lines 1-8).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the polyimid film of Nelson, since one would be motivated to make such a modification to better allow x-rays through (col. 10, lines 1-8) as implied from Nelson et al.

Also note that it would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the polyimid film, since it has been held to be within the general skill of a worker in the art to select a known material motivated by its suitability, wherein the suitability for this case is better allowing x-rays through (col. 10, lines 1-8) as implied from Nelson.

37. Regarding claims 32, 92, 181, and 186, Tran et al. as modified above suggests a system and method as recited above.

However, Tran et al. does not disclose x-ray transparency greater than approximately 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured.

Nelson teaches x-ray transparency for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured (col. 10, lines 1-8).

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the transparency of Nelson, since one would be motivated to make such a modification to better allow x-rays through (col. 10, lines 1-8) as implied from Malcolm et al.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with the transparency greater than 90%, since where the general conditions of a claim are disclosed in the prior art, discovering the optimum of working ranges involves only routine skill in the art. One would be motivated to make transparency greater than 90% to obtain a stronger signal.

38. Regarding claims 185 and 190, Tran et al. would necessarily have freedom from metallic impurities in excess of approximately .5 parts per million, due to the cleaning (col. 18, lines 21-30) or when first being built.

39. Claims 182-184 and 187-189 are rejected under 35 U.S.C. 103(a) as being unpatentable over Tran et al., Smallbone et al., and Nelson as applied to claims 181 and 186 above, and further in view of Rhine et al. (US Patent Application Publication 2004/01328485).

Tran et al. as modified above suggests a system and method as recited above. Tran et al. further discloses a large plurality of pores characterized by a specific surface area of at least approximately 100 m^2/g (col. 5, lines 48-65).

However, Tran et al. does not specifically disclose average pore diameters between 30 nm and 10 nm per pore, with the ability to contain approximately at least 0.1% by weight of foreign material relative to said high surface area material prior to saturation and high structural rigidity wherein a displacement does not exceed approximately 0.25mm.

Rhine et al. teaches average pore diameters between 30 nm and 10 nm per pore (paragraph 2), which would necessiarly have a material with the ability to contain approximately at least 0.1% by weight of foreign material relative to said high surface area material prior to saturation and high structural rigidity wherein a displacement does not exceed approximately 0.25mm, due to the nature of the material.

It would have been obvious, to one having ordinary skill in the art at the time the invention was made, to incorporate the system and method of Tran et al. as modified above with

the pores of Rhine et al., since such a modification would have involved a mere change in size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. One would be motivated to make such a modification for improved performance (paragraph 10) as implied from Rhine et al.

Allowable Subject Matter

40. Claims 161-168, 177, 178, and 191-200 contain allowable subject matter.

41. Claims 24, 25, 28-31, 36-43, 46-49, 54, 84, 85, 88-91, 96-103, 106-109, 114, 139, 140, 157, and 158 would be allowable if respectively rewritten to overcome the rejection(s) under 35 U.S.C. 112, second paragraph, set forth in this Office action and to include all of the limitations of the base, intervening claims, and base claim.

42. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 24, 84, 139, and 157, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including an upper transmission window comprising an atomic number below 10, structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns, substantial impermeability relative to fluid, x-ray transparency greater than 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured, x-ray scattering therefrom minimized to less than approximately 10% of radiation scattered from a column of fluid equal to one optical depth in the fluid of a characteristic photonic energy from an

element of interest for which a fluidic concentration is to be measured, and freedom from any single contaminant in excess of 1 part per million, when measured by x-ray fluorescence, in combination with all the limitations in each respective claim, intervening claim, and base claim.

Regarding claims 25, 85, 140, and 158, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including a lower transmission window comprising an atomic number below 10, structural rigidity to support up to 1/10 atm. of pressure without bowing more than approximately 100 microns, substantial impermeability relative to fluid, x-ray transparency greater than 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured, x-ray scattering therefrom minimized to less than approximately 10% of radiation scattered from a column of fluid equal to one optical depth in the fluid of a characteristic photonic energy from an element of interest for which a fluidic concentration is to be measured, and freedom from any single contaminant in excess of 1 part per million, when measured by x-ray fluorescence,, in combination with all the limitations in each respective claim, intervening claims, and base claim.

Regarding claims 28 and 88, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including electrode material comprising a large plurality of pores characterized by a specific surface area of at least approximately 100 m^2/g, an average pore diameter of said pores between approximately 30 nm and 10 nm per pore, a distribution of the pore diameters grouped with a standard deviation of less than approximately 20 nm around said average pore diameter, x-ray scattering therefrom minimized to less than an x-ray transparency greater than approximately 90% for characteristic photon energies from an element of interest for which a fluidic concentration is to be measured;

electrical conductivity of 10-40 mOhms-cm when fabricated into a 1/4 mm thick electrode, the ability to contain approximately at least 0.1% by weight of foreign material relative to said high surface area material prior to saturation, high structural rigidity wherein a displacement under the flow of said fluid does not exceed approximately 0.25mm, high wetting ability wherein an approximately 1/4 mm thick sheet of said high surface area material becomes substantially wetted in less than approximately three seconds, and freedom from metallic impurities in excess of approximately .5 parts per million, when measured by x-ray fluorescence analysis, in combination with all the limitations in each respective claim and base claim. Claims 29-31 and 89-91 contain allowable subject matter by virtue of their dependency.

Regarding claims 36, 39, 96, and 99, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including background data from at least one background data energy channel of a preconcentration cell when the cell is filled with a highly purified form of a fluid of interest and exposed to x-rays, in combination with all the limitations in each respective claim, intervening claim, and base claim. Claims 42, 43, 102, and 103 contain allowable subject matter by virtue of their dependency.

Regarding claims 37 and 97, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including sensitivity data from at least one sensitivity data energy channel of a preconcentration cell when the cell is filled with a first calibration solution containing at least one element of interest in a fluid of interest in known concentration above a minimum detection level of x-ray detection equipment, in combination with all the limitations in each respective claim and base claim. Claims 38 and 98 contain allowable subject matter by virtue of their dependency.

Regarding claims 40 and 100, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including test data accumulation means for obtaining test data comprising data related to a rate at which photons are detected when fluid flows at a substantially constant rate, while a voltage application means applies a voltage differential below an electrochemical potential of at least one element of interest and below an electrolysis potential of the fluid, in combination with all the limitations in each respective claim, intervening claim, and base claim. Claims 41 and 101 contain allowable subject matter by virtue of their dependency.

Regarding claims 46, 48, 106, 108, 191, and 195, prior art does not disclose or fairly suggest a system and method for detecting and measuring concentrations of elements in fluids including flow control means to maintain ε below approximately 5% for at least one element of interest, in combination with all the limitations in each respective claim, intervening claim, and base claim. Claims 47, 49, 107, 109, 192-194, and 196-198 contain allowable subject matter by virtue of their dependency.

Regarding claims 54, 114, 199, and 200, prior art does not disclose or fairly suggest an apparatus or method for identifying and measuring concentrations of elements in fluids including time control means for flowing fluid for a time t given by

$$t \propto \frac{Sl}{\sigma} \propto \frac{Sl}{C},$$

in combination with all the limitations in each respective claim.

Regarding claim 161, prior art does not disclose or fairly suggest a method including optimizing an upper high surface area electrode with an upper electrode thickness less than or equal to approximately an optical depth 1 of said upper high surface area electrode when wetted

with a fluid to be flowed through a cell, in combination with all the limitations in each respective claim. Claims 162-164 contain allowable subject matter by virtue of their dependency.

Regarding claim 165, prior art does not disclose or fairly suggest a method including optimizing an upper high surface area electrode with an upper electrode thickness less than or equal to approximately an optical depth 1 of said upper high surface area electrode when wetted with an element of interest for which a fluidic concentration is to be measured by a cell, in a fluid to be flowed through said cell, in combination with all the limitations in each respective claim. Claims 166-168 contain allowable subject matter by virtue of their dependency.

Regarding claim 177, prior art does not disclose or fairly suggest a method including optimizing an interelectrode gap range specified by:

$$d = \frac{\sigma \Phi}{q\varepsilon}\frac{w_i}{w_f}\frac{A}{n_f CF} x100\% \approx 2x10^{-9}\frac{\Phi w_i A}{q\varepsilon w_f n_f F} x100\% \propto \frac{\sigma A}{\varepsilon F},$$

in combination with all the limitations in each respective claim. Claim 178 contains allowable subject matter by virtue of their dependency.

Response to Arguments

43. Objections to the specification and drawings in the Office Action mailed May 18, 2004, has been withdrawn in light of the Amendment filed 3/1/05.

44. Applicants' arguments with respect to claims 1-23, 26, 27, 32-35, 44, 45, 50-53, 55-83, 86, 87, 92-95, 104, 105, 110-113, 115-138, 141-156, 159, 160, 169-176, and 179-190 have been considered but are moot in view of the new ground(s) of rejection.

45. Applicants' arguments filed 3/1/05 have been fully considered but they are not persuasive in overcoming various aspects of the prior art.

46. Regarding Applicants' arguments in point 6 of the Amendment filed 3/1/05, the added recitations do not overcome the rejection under 35 U.S.C. 112, second paragraph. As noted by Applicants, the claims recite a system comprising both a cell and associated data. As noted before, there are essential structural cooperative relationships of elements missing from the claim, namely means for obtaining data. The data associated with the cell does not have any structural attribute. Therefore, it cannot have any structural cooperative relationship with the other elements of the system. Furthermore, the added recitations do not recite "means for obtaining data". Although there may be an inference to such a means, the means itself has not been explicitly recited and claimed as a component of the system. Therefore, the claims have been interpreted as just claiming a system comprising a cell and data. Because of the deficiencies, the claims remain rejected.

47. Regarding Applicants' arguments in point 11 of the Amendment, Applicants argue that Tran et al. does not disclose or suggest anything about how to deduce concentration. The Examiner disagrees. Finding the point of saturation in a cell is a method for deducing concentration. For example, if analysis indicates that the cell is to the point of saturation, one can deduce that the concentration of the cell is greater than zero parts per billion for the ion of interest. Therefore, Tran et al. does disclose or suggest anything about how to deduce concentration.

48. Regarding Applicants' arguments in point 12 of the Amendment, Applicants argue that Tran et al. does not disclose transmissive windows for x-rays. Applicants further cite titanium as not having the necessary material properties to serve as a transmission window. The Examiner disagrees. In column 16, lines 13-20, Tran et al. discloses radiation sensors for x-ray fluorescence being placed directly on the cell. As noted by Applicants, a material such as titanium is used as a plate for the cell. This metal is known in the art to be used as a transmission window. Shefer et al. (US Patent 6148061) is cited here to show that titanium does have the necessary material properties to serve as a transmission window (claim 8). Therefore, these plates can be characterized as being x-ray transmissive.

49. Regarding Applicants' arguments in point 13 of the Amendment, Applicants argue that Tran et al. does not disclose slots substantially coplanar with the interelectrode gap. The Examiner disagrees. As seen in multiple examples from the Figures (fig. 5, #153, fig. 19, "inflow", fig. 23, flow from #515 to 502, fig. 28, "inflow"), Tran et al. shows slots substantially coplanar with the interelectrode gap.

50. Regarding Applicants' arguments in point 14 of the Amendment, Applicants argue that Tran et al. does not disclose the plurality of flow tubes. The Examiner disagrees. Figure 10 of Tran et al. does show a plurality of flow tubes. In that figure, those tubes are parallel.

51. Regarding Applicants' arguments in point 16 of the Amendment, Applicants argue that Tran et al. does not disclose access means. The Examiner disagrees. Flowing chemicals through the cell would necessarily require access means to put the fluid into the inlets and outlets. Therefore, Tran et al. reads on the access means.

52. Regarding Applicants' arguments in points 17 and 18 of the Amendment, Applicants argue that Tran et al. does not disclose or suggest the cell body maintaining position. The Examiner disagrees. The figures show the cell maintaining a position. If they did not maintain position, the cells would break apart and the device would not be able to operate.

53. Regarding Applicants' arguments in point 19 of the Amendment, Applicants argue that Tran et al. does not disclose the process of optimizing to obtain an electrode thickness. The Examiner agrees with this aspect of the argument, which has been exemplified by the indication of allowable subject matter in claim 161. However, as noted by Applicant, Tran et al. does disclose an electrode thickness which happens to fall within the range of thickness given by $l = 1 / (\mu \rho)$. Therefore, Tran et al. reads on the claims not limited to the manipulations of the recited steps, but only the structure implied by the steps.

54. Regarding Applicants' arguments in point 20 of the Amendment, Applicants argue that Tran et al. does not disclose the electrodes having an ordinary surface area approximately equal to an interrogation spot area. The Examiner disagrees. It is noted that the features upon which applicant relies (i.e., sizing the electrodes in relation to the x-rays) are not recited in the rejected

claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims.

55. Regarding Applicants' arguments in points 21-25, analogous responses are as recited above.

56. Regarding Applicants' arguments in points 26 and 27, Applicants argue that Tran et al. does not disclose or suggest "monitoring a total concentration of dissolved ions in said upper and lower high surface area electrodes while said electrodes are not saturated." The Examiner disagrees. Before the cell reaches a targeted breakthrough, sensors detect for this condition, which implies that sensors are monitoring while electrodes are not saturated. Therefore, Tran et al. does disclose or suggest monitoring while electrodes are not saturated.

57. Regarding Applicants' arguments in point 28, Applicants argue that Tran et al. does not have control to maintain the concentration within a predetermined concentration range. The Examiner disagrees. Tran et al. does have control as evidenced by the monitoring of targeted breakthrough.

58. Regarding Applicants' arguments in point 29, Applicants argue that Tran et al. does not disclose ionic release. The Examiner disagrees. Tran et al. discloses ionic release required for regeneration (col. 15, lines 4-8).

59. Regarding Applicants' arguments in point 31, in response to Applicants' arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. The combination makes obvious the use of a transportable voltage supply to make a system portable. Therefore, the combination would make obvious the portable use of the system described by Tran et al.

In conclusion, Applicants' arguments are not persuasive and the references remain applicable to the rejections above.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Chih-Cheng Glen Kao whose telephone number is (571) 272-2492. The examiner can normally be reached on M - F (9 am to 5 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ed Glick can be reached on (571) 272-2490. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

gk

EDWARD J. GLICK
SUPERVISORY PATENT EXAMINER

Application Number 10/065,683
Amendment Date: ???
Reply to June 18, 2004 Office Action
Replacement Sheet

Approved
CK
5/10/05

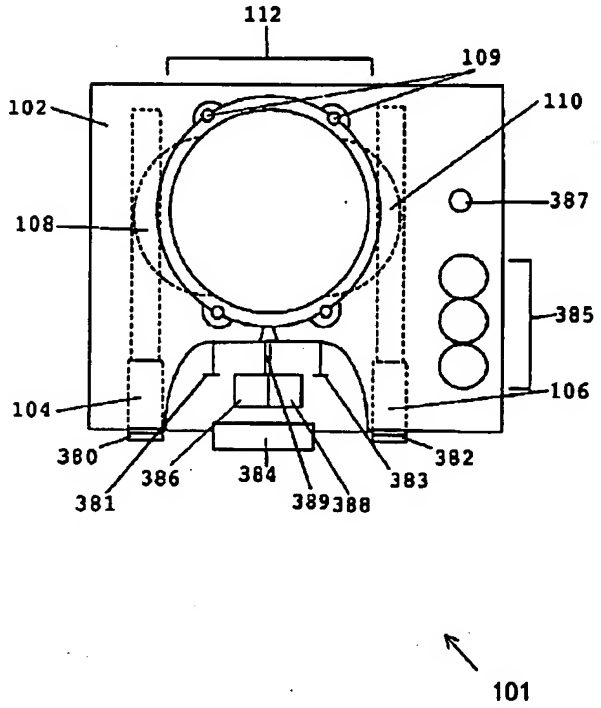

Figure 19

Application Number 10/065,683
Amendment Date: ???
Reply to June 18, 2004 Office Action
Replacement Sheet

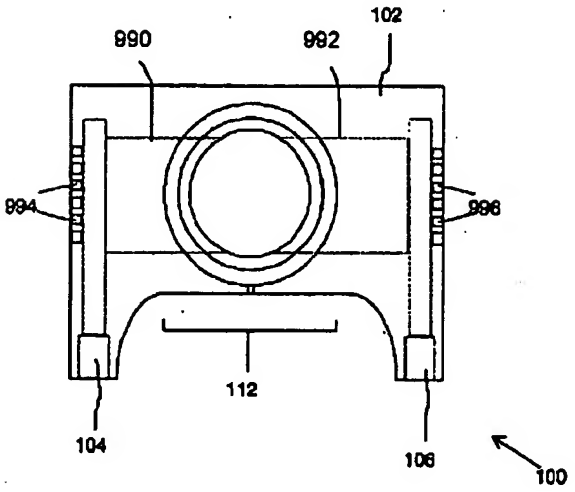

Figure 21

Approved
5/10/05

Application Number 10/065,683
Amendment Date: ???
Reply to June 18, 2004 Office Action
Replacement Sheet

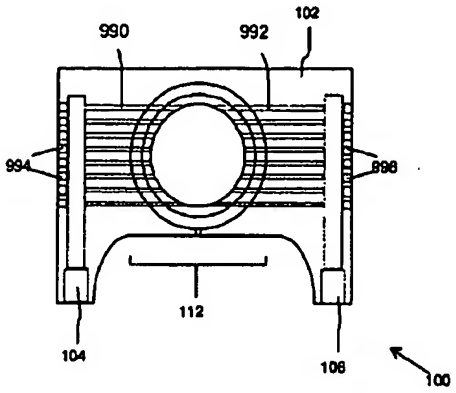

Figure 22

Approved
4/10/05